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TRANSLATIONS ON ENVIRONMENTAL QUALITY

No. 129

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YUGOSLAVIA

MEASURES FOR ELIMINATING KRKA RIVER POLLUTION DISCUSSED

Ljubljana ITD in Slovenian 3 Dec 76 pp 8-9

[Article by Ilija Bregar]

[Text] It may be, although it is by no means certain, that the greatest event that took place in Munich, the center of Bavaria, last year was the moment when citizens could gaze in the river and observe salmon spawning in the center of the city. Nothing like this has happened in a long time, declared the large headlines of local newspapers. For more than three-fourths of a century the Issar River was terribly polluted, indeed, a common sewer of industrial effluents.

And what could possibly be the importance of this event that we are mentioning it in the introduction of this article? First of all: the salmon is a most sensitive fish. The fact that salmon were spawning in the center of the city means that the industry of Munich, using filtering installations, was successful in cleaning up the Issar River, for all practical purposes completely.

You may be aware that out of all rivers in Slovenia the salmon and grayling still spawn (without man's assistance) only in the Krka River and perhaps in the Kolpa River, while the Sava River has for several years been altogether too polluted for this species. Most likely you are not aware of this and, moreover, the public is probably even less aware that the same fate now threatens the Krka River, too. We have discussed these and other matters, all of which we may not be able to relate here, with biologist Ivan Voh, director of the Institute of Fishery, and Tilda Herfort, biologist in charge of the professional service at the institute. We also personally inspected the source of the Krka and its tributary Visnjica and found for ourselves unassisted by test tubes and analysis that Krka, although still extolled as a river of exemplary purity, is no longer as pure as it used to be.

Danger From Two Sides

Let us make one thing perfectly clear: it is impossible to conceive of any kind of progress in the Krka River valley all the way to Novo Mesto without the river. This progress could be called tourism. Nevertheless, Krka still remains the best salmon spawning river of Europe. It is a paradise for prize fishing along with its many other attributes. For the time being, that is, because it is a fact that the effluent discharged into the river is already seriously detracting from its splendor and advantages.

We have read before, on several occasions, that the Krka River, the emerald beauty of Dolenjska, is becoming increasingly more polluted but only in the lower part of its course. In all those writings and discussions we had in mind only that part of Krka below Soteska, Straza and Novo Mesto. It was thought that everything was well and good with the upper part of the river but this is not the case. Indeed, the upper part has not been well for quite some time and matters are getting worse. Even though this article will not change the actual situation it may or may not induce some people who should be concerned with the problem to do some thinking.

As early as 10 years ago two Grosuplje opstina committeemen, both professional engineers, of agriculture and forestry respectively, who had at the time just completed their studies, were at the opstina assembly meetings pointing out that the Krka River is becoming increasingly more polluted to the great detriment of the area. We cannot say that the opstina committeemen openly laughed at the two men predicting the river's misfortune but they certainly did dismiss them with wry smiles and paid no heed to their warnings. Years have gone by, the pollutants were flowing into the river and yet the salmon and grayling, two of the best natural indicators of water purity, are still surviving. How much longer can they endure such indolence?

"Two years ago we built in the Krka village, practically at the source of the Krka River, a spawning place for the river trout. At the last year's spawning we were disappointed to find that the eggs became covered with organic substances which decomposed and smothered the eggs. This year we built a water filter," said biologist Voh. "If the Krka River remained in the future as it is today, life would somehow be able to go on," added biologist Herfort who, one could say, is more concerned about the Krka River's purity than her own health, seeing that she got out of bed where she was confined by illness to be present at our interview.

The natives say: "Sometimes the Krka River is muddy and stinks already at its source. Visnjica, the little tributary rivulet, is in any case almost always a common sewer. Visnjica is a small rivulet flowing from Visnja Gora thorough Ivančna Gorica and Muljava and joins the Krka River immediately at its source. At Ivančna Gorica this rivulet receives another small tributary, the Stiski Potok. And it is this small stream that is 'the source of evil.'"

All these "terrible" streams are in the domain of the Grosuplje opstina, which has been developing rapidly in recent times. Its planners, however, were oblivious of environmental protection. The sources of pollution of the Krka River in its upper part should be attributed to the settlements of Grosuplje, Ivancna Gorica, and partly also to the Krka village. The upper part of the river is protected but this is a rather poor consolation for the fishermen if the above settlements do not install modern filtering equipment. "In 10 years we shall have in the Krka River only the whiting and other hardy fishes instead of trout," asserted Lojze Stoj, fish game warden on the 9-kilometer stretch from the source of the Krka to Zagradec on the border of the Novo Mesto opstina.

Everything in the following passage has already been published in the report prepared by biologist Herfort with which the Grosuplje opstina committeemen are already familiar. The settlement of Grosuplje has two filtering installations which, however, are not functioning because they are not suitable for the purpose. In addition, many polluters have no filtering equipment. The main sources of pollution are the two farms Brvace and Bostanj, suppliers of dairy products to Ljubljana; much less pollution comes from the Motvoz in Platno [Rope and Linen] enterprise, but the Kovinostroj enterprise's metallic branch is much worse because it has no filters for the fats. On Fridays, Saturdays, and Sundays the sewer in Bicevje is frothing with detergents and soap because the housewives do their weekly washing. All this filth sinks underground in Racna, only to emerge after an approximately 3-kilometer long underground passage as the Krka River. The popular saying which claims that water is good again for drinking as soon as it has passed over seven stones does not hold for karst terrain.

In Ivancna Gorica the situation is as follows: into Stiski Potok and thence to Visnjica are discharged all the effluents of the dairy and the butchery. Less harmful is the foundry of the Ljubljana IMP, although its deposits under Polzevo represent an indirect threat; the Avtoprevoz enterprise is not "clean" either, but the worst polluter is the pig farm at Marof. The sewage from it is discharged into a subterranean cave and it is almost certain that the filth flows through underground channels back into the stream. It is too early to predict what the new factory of plastic silos will contribute to this.

Somewhat less acute is the case of the Krka village. Some houses discharge their sewage into the Krka River. The sewage from the store is apparently made to bypass its cesspool and is discharged directly into the river, if one is to believe the local rumors.

No Funds To Implement Plans

Both Grosuplje and Ivancna Gorica have plans for joint filtering installations with Grosuplje being in the lead. All feel that both projects should be implemented concurrently and at an early date. But there are no funds. Unfortunately, we cannot overlook the fact that the Grosuplje public

health authority inspectors took an altogether inadequate interest in the manner and did not do all that it could and should have done. If it is any consolation we might add that the situation is not much different elsewhere.

Filtering equipment is expensive. Generally it has to be imported and is subject to excessive customs duty, which appears uncalled for. The opstinas and their officials are afraid to demand that factories install filtering equipment because they are dependent on them. Accordingly, it may be appropriate to deal with the environmental protection matters at the regional level instead at the opstina level which is being vigorously advocated in some quarters. According to this proposal, the opstina public health inspectors would be replaced by the practically independent regional inspectors.

Slovenia and its rivers are somewhere in the middle on the pollution chart. Western Europe has already reached the peak and is now gradually and at great expense climbing down. If the experience of the West is not to repeat itself in our country it would be more economical to take charge of the situation immediately because after a time solution of these problems will require considerably greater outlays of funds.

Responsibility for Dams

In discussing environmental protection of rivers we can touch upon another rather interesting question, namely, who should be responsible for the dams. Those familiar with the practical importance of dams will immediately agree on this question while the uninitiated will profit from the following explanation. The original purpose for which the dams were constructed was to enable the flour mill and sawmill operators to use the hydraulic power of the river, later dams were built for hydroelectric power plants. Another reason for building dams was to "calm down" the river and, sometimes, to prevent the fish from escaping from one fish and game district to another. In recent time still another, most important function is being performed by dams: they are natural biochemical water purifiers. In falling over the dam water is aerated and enriched with oxygen. The mills and their owners are gradually dying away and the dams are falling apart. The water resources community wants to have nothing to do with them, claiming that the dams are not its concern. There are four dams on the Krka River between its source and Zagradec or rather, there used to be; one fell apart while three were repaired. Strange that dams, which are increasingly more important from day to day on the one hand, are becoming increasingly more neglected on the other.

The Struggle Will Continue

Fishermen, natives, and other friends of the Krka River insist that this river must remain clean. It must remain what it used to be at least as

far as Novo Mesto. The Smihel preserve between Zagradec and Zuzemberk was until recently renowned throughout Europe but today it is empty. Not because of pollution, but rather because of misdirected fishing policy. The salmon, grayling, river trout and other "noble" fishes are a veritable attraction for both domestic and foreign fishermen.

"Our plans," said biologist Voh, "provide for spawning the trout in hatcheries and then returning them to the river where they may be caught. Sport fishing should be the hallmark of the Krka River. Trophies caught here are valued both by us and those who catch them."

The Krka River means fishing and both things together imply tourism on land. "English and German women are jealous, too," says the Kras innkeeper with a grin on his face. He means that the Englishmen or Germans who come to fish in the Krka River bring along their wives and children, too. They all have to eat and sleep somewhere and this brings in business. Interesting, is it not? A clean river, then, is also one of the conditions necessary for increasing the sales of steaks and sausages.

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POLLUTION PROBLEM IN TEHERAN

Teheran ETTELA'AT in Persian 16 Dec 76 pp 5, 30

[Article: "Teheran Faces Severe Traffic and Air Pollution Problems"]

[Text] "A city full of tumult and noise, calumny, lies,
backbiting and curse.

Tired of so much noise, the ears cry for peace
Fed up with such a life, Oh death do interfere."

The day the late Malekoshsha'ra-ye Bahar was so fed up with living in Teheran and in that society that he composed the above-mentioned quatrain, the population of Teheran did not exceed 1 1/2 million. The borders of the city on those days were less than half of what they are today. Compared to today's tumult, the noises of the city on those days soothed the ears. And, this is how comparison is made of today and yesterday's number of transportation vehicles, the air pollution, and the most important of all, the traffic of Teheran.

Fifty New Cars Every Hour

The traffic of Teheran is becoming a big problem for the inhabitants of Teheran and those in charge of the urban affairs. No matter what method is used to solve the problem, the problem becomes worse. An example to show what the problem of the traffic in Teheran looks like, imagine taking 10 cups of water out of a basin filled with water, and instead pouring 10 buckets of water into the basin every morning. It is quite evident what would happen to the additional water.

The streets of Teheran are limited and they are being expanded very slowly. On the contrary, every day, 400 vehicles receive new license plate numbers in Teheran, a result of 8 hours of effort at the Department of the License Plate Registration. In other words, in 8 hours, 400 vehicles are added to the traffic jam in Teheran. That is, 50 cars an hour. This means that when you set out from the beginning of Sayyid Khandan 45 Meter Road for the destination of the bazaar, 50 more cars would be added to the long chain of

vehicles by the time you reach your destination. Under these circumstances, what can really be done? If we had been in the shoes of those responsible for the traffic, what measures could we have taken? Nothing, but using and trying new methods and procedures that could help make the traffic light.

The last prescription that the experts have prescribed for the traffic problem is to make the streets 'One Way'. "Only God knows how effective this prescription will be and if this solution has really been studied. Neither the responsible authorities nor the drivers and pedestrians know. This is just guessing, but we should hope for its success, for like the construction of the fly-overs, it may not turn out to be effective. According to what a person informed about urban affairs pointed out, the construction of the fly-overs would help improve the traffic condition, only when there are fly-overs at every intersection in Teheran. And, a fly-over only at, for instance, Sa'di-Roosevelt Intersection, which transfers the load of traffic to the next intersection (Takht-i-Jamshid), would not solve any problem. Anyway, under the present circumstances, the traffic of Teheran is a tangled skein that cannot be opened in any way, unless other fundamental measures are taken along with the construction of fly-overs, bridges for pedestrians, and turning the two-way streets into "one-way".

Really, what is to be done to solve the traffic problem in Teheran? At present, Teheran has close to one million vehicles which are being increased at a regular rate of 400 vehicles a day. With this calculation, every year 146,000 vehicles would be added to the number of vehicles in Teheran. (It is said that the number of vehicles which receive license plate numbers in Teheran exceeds 170,000 annually.)

In other words, within the next 3 years, the number of vehicles in Teheran would exceed one and a half times the present number. And, if this ratio increases, we should expect to find the streets of the capital city buried under the wheels of two million five hundred vehicles by the year 1981. Wouldn't a constant 24-hour traffic jam paralyze Teheran? Obviously, then or perhaps much sooner, the traffic would severely endanger the urban life in Teheran. What would our high-ranking city officials do that day? Would they sit and await a miracle to cure that cureless pain? Obviously not. One cannot see the vital artery of a city with 5 million population being torn apart and not say anything. Certainly, on such a day, the responsible authorities would take a series of fundamental and definite measures. Now, supposing the day that one cannot even drive a few hundred meters has arrived. What emergency actions would you take, other than the current measures? Certainly, when the passengers and vehicle owners are driven to extremities, inevitably fundamental actions would be taken. So, start taking that fundamental action now.

Dangerous Air

Along with the traffic problem, and the difficulties that it has brought about, there is a more serious problem: The air pollution. However, the traffic problem is so severe that no one thinks about it.

Teheran, which is surrounded by mountains on three sides, is one of the most polluted cities of the world. The result of the survey made by experts of the Environment Protection Organization shows that 89.7 percent of the pollution in Teheran is caused by carbon monoxide gas which is produced from the burning of gasoline used by vehicles, and that only 10.3 percent of the pollution is caused by other factors, such as the industrial and production units.

What is wrong with Teheran is that this city does not have a breathing atmosphere like New York, Paris, and London. And so, mostly on the days when the west wind does not have the power to blow away the polluted air, several tons of polluted materials, sometimes poisonous air, remain heavily over the heads of the inhabitants of Teheran. Under such circumstances, if you take a look at Teheran from a high area in Shimiran, you can clearly see the thick polluted cover over the city.

According to the reports of the experts, the air pollution in the intersections of Teheran is 10 times more than the permissible limit. A study made by the Children's Medical Center shows that some type of an allergy has occurred among children, ages one to three, which did not exist before. The specialists believe that the allergy of the children in Teheran is caused by the air pollution.

In order to realize how polluted the air is in Teheran, pay attention to what Doctor Sakhawat, one of the top Iranian specialists has said:

By taking and testing the samples of air in Teheran, Doctor Sakhawat has warned the officials that the air pollution in Teheran has reached the saturation point. The warning is based on the following reasons:

The clean air is a combination of nitrogen gases (78 percent); oxygen (21 percent), and other gases such as helium, argon, ozone, carbon dioxide, etc...

Such air would have two types of oxygen: Oxygen with positive charge and oxygen with negative charge. In the clean air, the ratio of oxygen with negative charge to oxygen with positive charge is four to one. In other words, for every four oxygens with positive charge, there is one oxygen with negative charge. "It is worthy of mention that oxygen with negative charge plays an important role in the revitalization of human cells."

The test made by Iranian experts at Shush Circle at midday shows the following ratio of oxygen charges:

For every oxygen with negative charge, there are 4,800 oxygens with positive charge. (Whereas, there should only be four oxygens with positive charge.) In other words, the amount of oxygen with positive charge in the polluted air is 1200 times more than what it should be. How are these poisonous gases produced? If an automobile which functions with gasoline, operates in the city for an hour during the day, covering 30 kilometers, the poisonous gases

that come out of the exhaust pipe would be totally 1,806 grams. (1,500 grams of carbon monoxide, 210 grams of unburned hydro-carbons, 90 grams of different types of nitrogen oxides and six grams of other particles in the air such as soot.)

Now, supposing that of the one million vehicles in Teheran, only 750,000 operate for an average of three hours in the city. In that case, 39,635,000,000 grams (about 40 tons) of poisonous materials would be added to the air pollution. From this the authenticity of Dr Sakhawat's tests and the importance of his warning can be grasped. While seeking a solution for the traffic problem, do the authorities also pay attention to the air pollution which has really endangered the health of the people?

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USSR

UNIFIED ENVIRONMENTAL ACTION CENTER URGED FOR USSR

Moscow MOSKOVSKAYA PRAVDA in Russian 1 Dec 76 p 2

[Article by L. Bubnova, deputy chairman of the Moscow board of the Scientific and Technical Society of the Oil and Gas Industry imeni Academician I.M. Gubkin: "Only Jointly: For the Model City -- A Model Nature Conservation Service"]

[Text] In the course of the present year our newspaper has come forward more than once about problems of environmental protection. Devoted to these problems, in particular, were the articles "Don't Open What Is Opened" (24 January), "One's Own Contribution" (15 February), "Nature Conservation -- A Common Concern" (29 April), "For a Clean Environment" (3 November) and a number of others. Expressed in almost all these publications was the idea of coordination of the efforts of interested organizations occupied with problems of development and introduction of highly effective purifying facilities of different types. The scientific and technical society of the oil and gas industry imeni Academician I.M. Gubkin undertook to solve the given problem.

The scientific and technical society, which is headed by Doctor of Technical Sciences Prof A.I. Gritsenko, is one of the largest in the capital. It numbers in its ranks about 11,000 people, associated in 65 primary organizations. At enterprises, in vuzes and scientific institutions the members of the society perform a great deal of work for environmental protection. The article published below tells about the initiative directed at a further rise in the creative activity of the scientific and technical community.

In the socioeconomic plan of development of the capital up to 1990, worked out by the Moscow City Committee of the CPSU, measures are outlined for turning Moscow into a model communist city. An important place is occupied in these measures by questions of environmental protection. A cautious,

thrifty respect for nature is advanced in a number of priority tasks, inseparably connected with improving the health of the population, with providing the necessary conditions for fruitful labor and leisure.

Nature conservation is an important matter. It concerns one and all. And particularly such mass organizations as the scientific and technical societies (NTO). As a rule, concentrated in these sectorial societies are great scientific forces capable of solving complex problems. Working just in the Moscow organization of the scientific and technical society of the oil and gas industry are more than 1,100 candidates and doctors of sciences. I want to stress that they do work and work fruitfully.

Here is a concrete example. The primary organization of the scientific and technical society of the Moscow Institute of the Petrochemical and Gas Industry imeni I.M. Gubkin (MINKh i GP) accepted the obligation to supply to the maximum the demands of capital enterprises for highly effective installations for air purification in the course of the Tenth Five-Year Plan. These obligations are being realized successfully. Jointly with a number of enterprises the institute scientists have developed and are introducing, in particular, methods of burning fuel wastes with subsequent utilization of the heat produced in the process of combustion. Among the permanent partners of the vuz are the oil refinery, the machine tool building plant imeni S. Ordzhonikidze and others, and certain institutes of the USSR Academy of Sciences.

In strengthening relations with production, the members of the scientific and technical society of the MINKh i GP in addition decided to assist the enterprises in the training of specialists. The vuz is prepared to open its doors widely for engineers and technicians of plants and factories for the purpose of improving their skills in the field of improving the quality of the burning of gas and fuel oil, economy of fuel, and protection of the air basin. The institute also assists the enterprises in selection of matriculants, and in preparing them for the exams.

Concrete obligations regarding assistance to the city's industry in setting up and introducing different purification facilities have been taken on by primary organizations of the scientific and technical society and the scientists of the State Scientific Research Institute for Industrial and Sanitary Purification of Gases (NIIOGaz) and the State Scientific Research Institute for Nonferrous Metals (GNIITsvetmet), and a number of others. These undertakings acquire especial significance in the light of the measures contained in the joint resolution of the bureaus of the Moscow City Committee and the Local Committee of the CPSU, the executive committees of the Moscow soviet and the Moscow Oblast soviet about strengthening environmental protection in the city and protecting its forest-park protective zone. This is why the board of our society is taking all measures so that such obligations will be worked out by each primary organization of the scientific and technical society. We feel

it is our duty to make a worthy contribution to the solution of the problems connected with transforming Moscow into a model communist city. Protection of the environment is one of these important problems.

There is much work to be done. To be continued in the capital in this five-year plan is the construction and renovation of dust collecting and gas purification installations. The majority of enterprises will be equipped with means of automatic tracking of the level of harmful discharges. Realization of the given tasks is especially important because improvement of the condition of the atmospheric air is a chief factor in sanitation of the environment. The given problem is an urgent one also in connection with the fact that concentrated in the city are large plants of such sectors of industry as the chemical, metallurgical, oil refining, power, and construction materials. Development and introduction of new highly effective purification facilities, proper operation, clear and regular control over their operation -- these are the questions taking on primary significance. And it is necessary to solve them only jointly, by collective efforts.

However, as has been pointed out justly in a number of statements in MOSKOVSKAYA PRAVDA, many shortcomings in the activity of the environmental protection service are explained by the interdepartmental separateness of the organizations performing planning and design development and construction of gas and dust collectors and other types of installations. This was told about, in particular, in an article by the head of a division of GINTsvetmet, G. Gordon, in an article published on 24 January 1976, and in certain other publications. A serious discussion on the given topic was held at the recent conference of representatives of capital sectorial scientific and technical societies.

The wide volume of opinions, generalization of already accumulated experience, and determination of new concrete tasks in the light of the decisions of the October 1976 Plenum of the CPSU Central Committee and the plenum of the party city committee held on 10 October of this year allowed the Moscow scientific and technical society of the oil and gas industry to come forward with an initiative -- to create a unified coordination center for development and implementation of measures for environmental protection and to take this important matter under its direct control. The members of the scientific and technical society appealed to their colleagues to unfold widely a socialist competition under the slogan: "For the Model City -- A Model Nature Conservation Service."

The high socialist obligations were reinforced by concrete organizational and technical measures. I will mention some of them. The environmental protection section of the board of our scientific and technical society and an analogous committee of the city soviet will implement coordination of all projects for creation and introduction of highly effective purification installations of different types. It is planned in 1977 to hold a competition for the best scientific project and an intersectorial conference

on "Problems of Rational Utilization of Natural Resources and Environmental Protection in Moscow and the Oblast" with the participation of all scientific and technical societies of the capital and interested organizations. Henceforth to be included without fail in the personal and collective creative plans are questions connected with development of these or other measures for nature conservation.

By joining efforts with research institutions, enterprises, vuzes, and mass organizations, the members of our scientific and technical society will do everything in order to improve the quality and effectiveness of our work, to make a worthy contribution to the common mission of turning Moscow into a model communist city.

From the editors: When this article was being readied for publication we received a communication that the initiative of the scientific and technical society of the oil and gas industry has been enthusiastically supported by other scientific and technical societies -- of power engineering and the electro-technical industry, of municipal utilities and domestic services, and by the Moscow board of the All-Union Chemical Society imeni D.I. Mendeleyev.

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EFFORTS TO REDUCE AIR POLLUTION BY INDUSTRY EXAMINED

Moscow IZVESTIYA in Russian 11 Dec 76 p 2

[Article by Yelena Chernykh: "Clean Air"]

[Text] Galina Grigor'yevna Luk'yanova and I are talking about something one would think of as elementary: What is clean air?

Strictly speaking, clean air is 78 percent nitrogen. 20.9 percent oxygen, 0.03 percent carbon dioxide, microscopic amounts of hydrogen, argon, helium, xenon, radon....

This is the air of the mountains, the forests, the meadows and the seas, of places where fresh breezes blow, fast rivers flow and limpid lakes slumber in the sedge; and here the air is filled with the fragrances of the blossoms, with salubrious salts and the conifers' elixirs--with everything that gives health and the joy of living to a man. Our astronauts saw the planet Earth in a blue aureole of clean air, the warehouse of man's health established by his green friend.

In the cities and at plant sites the air has many different contaminants. How are the harmful effects neutralized under these conditions? It's possible to pump clean air through pipes from the forest or the seashore, and they do it. Some shops have industrial conditioners. And the old method of forced ventilation is still around. But the air can be contaminated and full of dust not only in a shop but also on the plant grounds, and the shop will be "breathing" it.

"Cleansing the atmosphere of harmful impurities is a major item for any industry," declares Galina Grigor'yevna.

For Luk'yanova this is a profoundly scientific matter and, for the most part, an uncomprehended phenomenon. She works in the laboratory of gas and dust recovery of the All-Union Central Scientific Research Institute of Work Safety of the AUCCTU. She and her comrades have the job of helping industry clear the air at production sites to bring the contaminant level down to the maximum

permissible concentration. The air should contain no toxic matter, dust, gases or excessive moisture. Their means for accomplishing this include approved methods: absorption of harmful substances by antipodes, burning them at high or low temperatures....

We are sitting at a small table by a window in a laboratory of the institute cluttered with racks of specimens, devices made of glass tubing and flasks filled with active liquids. Here, scientists supplied with superior equipment have been looking for the key to clean air. The white coveralls, the tweezers and syringes give a clinical impression; the precision of movement is typical of surgeon and chemist. Luk'yanova is a small woman with a pleasant face, a clear voice and boldness in her eyes. Her luxuriant hair is drawn together neatly at the nape of her neck. Attracted and enthused by the humanness of the idea, she talks about setbacks in their research. In the 3 years there have been not a few of them. The scientists set up an artificially gas-contaminated medium; then, at a temperature of 200-400 degrees they killed the toxic substances in it. On the basis of the research equipment is being created for one of the chemical plants near Moscow. Designed by the State Institute for Planning Gas Purifying Installations, it has undergone industrial testing and will be series produced by a machine building plant in Yaroslavl Oblast. The method discovered by Luk'yanova's group will be employed at wood working, shipbuilding and aircraft industry facilities. Installed on the plant site, the equipment draws off exhaust air through piping from the shops and releases it clean into the atmosphere. The health and work of tens of thousands of people depend in large measure on its operation.

Dust and gas contamination of the air in shops, coal mines and iron ore mines brings on premature fatigue and, along with it, lowered work capacity and accidents. For this reason the world is full of practical interest in maximum permissible concentrations. The clean air problem is today one of the most critical in science. In our country, dozens of scientific research institutes, planning institutes and design bureaus are working on technology to enable the permissible concentrations to be achieved. A group of specialists at the Taganrog Radiotechnical Institute has developed a method of dust recovery by means of sound. A plan has been developed for an intake installation for air from the surface of Balkhash for a mining and metallurgical combine. In the All-Union Central Scientific Research Institute of Work Safety a chip vacuuming device has been designed to go on the cutter holder of a metalworking machine tool. The employment of high-speed cutting systems in machine building has increased the flow of turnings and dust during milling, turning and drilling. Ventilating and dust recovery units have been developed for shops processing nonferrous metals, plastics and thermoreactive materials. An outfit has been developed for the localization of sources of dust emission by means of an air-mechanical foam. It suppresses dust during the mining and processing of ore and coal, during the loading and unloading of minerals and at crushing and grading mills. A wet dust trap has been developed for casting shops. The air which has been rendered safe, like the water from purifying installations, is returned to natural circulation. Means for individual protection of the production worker are in use. Many of the devices also make possible an

improvement in the quality of products and facilitate mechanizing the collection of production wastes, which has a beneficial effect on culture and the productivity of labor.

If all that has been developed, tested and approved were being widely used in industry, the matter of maximum permissible concentrations would be taken care of. However, in short, the planned installation for feeding clean air from the surface of Balkhash to the mining and metallurgical combine has not been realized although it was approved several years ago. The chip vacuuming device on the cutter holder was introduced in 1957 at the First State Bearing Plant; the Minsk Bearing Plant introduced it later in the production of brass bearings and retainers. The device was approved in 1971 by the Main Administration of the Bearing Industry of the USSR Ministry of the Automobile Industry, but has not been widely used at automobile industry enterprises. Just recently the Ministry of Agricultural Machine Building authorized its spare parts plant in Odessa to set up production of the chip vacuum for the enterprises of its sector. Luk'yanova's group has to be thinking: anyone connected with the permissible concentration problem knows what it means and aches to see it put to use.

I want to tell you about some valuable research in the same area of labor protection carried out by a group of specialists of the Experimental Scientific Research Institute of Metal-Cutting Machine Tools and the All-Union Central Scientific Research Institute of Work Safety under assignment from the State Committee on Standards of the USSR Council of Ministers. An extensive system of work safety standards for metal-cutting equipment has been developed and is a credit to our industry. It takes into account the proper positioning of the controls, the equipping of machine tools with noise dampers and automatic chip/turnings removal. We find here as well the requirement to put to use individual equipment for dust and turnings removal mentioned earlier. The system was accepted and confirmed by the USSR State Committee on Standards for the machine tool building industry. In accordance with the State All-Union Standard on the system, as of 1978 all lathes, milling machines and drill presses produced must be equipped with suction devices. The new standard injects strict order into the solving of the problem of protecting the health of the machine tool operator.

But let's go back to the All-Union Central Scientific Research Institute of Work Safety. The institute is oriented toward the study of intersectorial problems of improving work conditions and supervises industry in this regard. As director M. Tsutskov says: "The designer at the plant and in the scientific research institute can't make a step without us." Here, to the center of production environment sanitation, are addressed requests for the latest developments in this field and...reproaches for unsatisfactory introduction of them. Here, a modern research base has been established, personnel trained and traditions built up. Every opportunity exists to purposefully coordinate the efforts of an army of specialists thousands strong tied into solving the problem of maximum permissible concentration. If this is so, then the institute ought to carry progress into industry, implement decisions with consideration for contemporary technical and social requisites. But such is not the case.

A group of the institute's associates is working, for example, on apparatus for exhausting harmful vapors when one is painting with a sprayer. This obsolete technology is still in use somewhere, but the leading enterprises long ago switched to painting machine tools, machinery and equipment in closed chambers with no one present; many do the painting in an electrostatic field. The institute shouldn't in this case be recommending to industry that it push the introduction of new technology while it's accommodating the old with its own operations.

We mentioned early in this article the old method of shop ventilation. Certainly, in the light of a developed industry, ventilation is a low-level method but not one in which science is losing interest. It embodies the history, the foundation on which advanced achievements in the area of maximum permissible concentrations are based. In any event, let's begin from the beginning. There are two scientists, masters of ventilation, who have brought world recognition to the All-Union Central Scientific Research Institute of Work Safety--V. V. Baturin and V. V. Kucheruk. They laid the foundation of industrial ventilation in the USSR during the first years of Soviet rule. Students are still taught per their major works. Their books are the reference books for specialists in many countries.

It would appear they'd taken on a dull subject. But, having devoted their life to it, they were able to amplify its scientific and applied value. Baturin leaned toward theoretical developments while Kucheruk was heavy on the practical side. The most offensive producers in the thirties and forties were considered to be the forge shops; they used coal and gave off heat and gas. Kucheruk looked into the ventilation of hundreds of forge shops in the automobile industry and proposed rational engineering solutions to their ventilation problems. Under his guidance, studies were conducted later on working conditions at complex mechanized and automated facilities.

The scientists have left their descendants a rich heritage, not only in technical ideas but in labor over the cares of mankind. Recently, in the Hall of Scientific and Technical Propaganda imeni Dzerzhinskiy, there was a seminar dedicated to Baturin and Kucheruk attended by scientists who remembered them personally or by reputation.

We have talked of but few of the works connected with clean air in the shop. Sanitation of the industrial environment takes in a range of problems. Noise and vibration are, for instance, among the contaminanats of air. Extensive research, tremendous work is being laid on here. The problem of sanitizing the air at industrial sites constitutes the crux of party pronouncements aimed at high labor efficiency and health protection of the workers.

5454
CSO: 5000

TASHKENT OFFICIALS MONITOR AUTOMOTIVE EXHAUST EMISSIONS

Moscow TRUD in Russian 25 Dec 76 p 2

[Article by A. Yes'kov, driving instructor, State Automobile Inspection, Uzbek SSR Ministry of Internal Affairs; A. Musayev, automobile engineer-mechanic; Ye. Basov, driver; and G. Kryuk, TRUD correspondent: "A Clean Sky Over the City"]

[Text] Tashkent--"What's the penalty for, inspector?"

The driver of the Spetsmontazhvodstroy [expansion unknown] trust's tank truck, K. Ogay, is truly perplexed when one of the members of our raid brigade, invested with special enabling rights, orders him to remove the number tag from his vehicle immediately and follow to the garage. The mobile chemical laboratory which we had set up on the Kuylyukskoye highway, had just run a check on the tank truck's exhaust: the gas analyzer registered the carbon monoxide content at twice the norm.

For several hours we'd been stopping ZIL's, GAZ's, Moskviches, Zhigulis and Volgas on the busy Tashkent thoroughfare and running tests. The results were sad: every third driver violates the country's adopted standard.

Taxis bearing numbers "90-57 TND" and "00-71 TNZ" drive up to our laboratory, both vehicles from the third taxi pool. It's obvious both engines are smoking. The drivers, N. Sokolov and A. Rasulov offer the lame excuse: they were in a hurry to get going, didn't take sufficient care. In the case of their colleague from automobile combine No 2, I. Murzakov (vehicle "45-09 TNZh") the gas analyzer registered 5 times over the toxicity norm.

"I'm in very much of a hurry; give back my license, please," says V. Ponomarev irritably as he sits at the wheel of a passenger car. He is, it turned out, shop chief for motor transport enterprise No 10 of the Main Administration for Housing and Civil Engineering Construction in Tashkent. This graduate automotive engineer didn't get around to adjusting his carburetor prior to departure. The result was intensive emission of carbon monoxide. Ponomarev was highly offended when he left us, still not understanding why his precious

time was taken up. It has to be admitted that he wasn't alone in his indignation. In the majority of cases, the people who were detained looked on us as cranks, addled if not altogether empty-headed, and the problem as unreal.

But our awareness of the problem was not of a theoretical nature. Our heads grew heavier from hour to hour. Standing in the middle of the heavy traffic, enveloped by a gas cloud, we felt that the State Automobile Inspection people had good reason to talk seriously about contamination of the air of large cities. Their observations of many years point directly to an interrelationship between accidents and mishaps on city highways and increased fatigability of drivers due to excessive saturation of the atmosphere with harmful components of exhaust gases. The street is the chauffeur's workshop; 60 percent of the mileage of all our passenger cars is put on in city driving. Even a car in good condition emits annually on the average of 529 kilograms of carbon monoxide alone, not to mention the other substances. That's just one properly adjusted car. What about the dozens, hundreds, thousands not properly adjusted?

As we can see, this is not nearly so much a professional problem as it is a social problem. It's possible to move offensive production outside the city, fence off a sanitary zone, outfit with expensive purification equipment. An automobile is a miniature plant on wheels invading residential and recreation areas, smoking from daybreak until late at night, yet outside of serious and effective control.

Large groups of scientists and designers are working on this problem in our country and we have today the cleanest cities in the world. The traffic system is being improved. According to information from the Tashkent city sanitary and epidemiological station, on such busy arteries of the Uzbek capital as Bogdan Khmel'nitskiy and Shota Rustaveli the gas pollution has been halved over the last three years despite considerably increased traffic volume. The reason is simple---they introduced the "green wave": vehicles have to stop and start less frequently at traffic lights, the amount of engine operation at low and idling speeds---responsible for the major share of the emission of harmful substances---is reduced.

It is today within our power to considerably clean up the air of the cities. Without capital expenditures and without cumbersome measures. Why were the engines of the vehicles we inspected smoking? In 80 percent of the cases it was due to carburetor adjustment. For those not technically inclined, let's say that one of us, armed with an ordinary screwdriver, eliminates this defect by a simple move of the hand in not even minutes, but seconds! After that, the engine emits two, three, five times less gases harmful to man. There's a social problem for you!...

When we talked later on with the supervisors of the unfortunate motor vehicle establishments, their answers were the same almost word for word: "There was really no importance attached...."

Why doesn't it cross anyone's mind to drive out of the garage in the wintertime without a windshield wiper? In the first place it's foolish and in the second place you'll be fined. But what about a smoking engine? There is a point in the "Highway Traffic Rules" which forbids operation of a vehicle if the carbon monoxide content in the exhaust gases exceeds the established norm. Only this point worries one but little today. Vehicle inspectors don't have the opportunity to apply it since their equipment doesn't include the necessary instruments. That portable gas analyzer we used during the raid was not produced by a plant but by the hands of experts. There is no similar device or special test stands in most of the motor vehicle establishments in the Uzbek capital; and in those where they do exist they are regarded as an exotic toy.

But we'll be fair. There is also, in Tashkent, the exceptional experiment of an organization that views the problem with understanding and responsibility. At the seventh taxi pool a vehicle doesn't go out without a special coupon certifying the engine has had an exhaust check. The experts we spoke of work here; they have built a portable laboratory for linear testing of motor vehicles. And their laboratory is not for committees and not a bookkeeping item; it's for everyday hard work.

Care about clean air for our cities is needed not tomorrow but today. It is as necessary as the air--without the contaminants, of course.

5454

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NORWAY

'ROSENQVIST REPORT' ON CAUSES OF POLLUTION DISCUSSED

Oslo AFTENPOSTEN in Norwegian 1 Dec 76 p 4

[Text] The points of view presented in Professor Ivan Th. Rosenqvist's report do not justify weakening the efforts to determine the cause of the spreading of air pollution in Europe through international cooperation. This was stated by the Environmental Protection Department in a press release commenting on the Rosenqvist report. Professor Rosenqvist has, as is already known, pointed out the fact that changes in agricultural procedures may be contributing factors leading to acidic water and fish kill, and that the acidic process is not necessarily caused by spread of pollution through the atmosphere. The leaders of the research project called 'The Effects of Acidic Precipitation on Forest and Fish', the SNSF project, also comment on Rosenqvist's report, and stress that the project has proved that it is highly probable that there is a cause and effect connection between the rate of acidic precipitation and the extent of pollution in our rivers.

The Environmental Protection Department feels it is of continued importance to look into the possibilities of setting a certain common standard regarding the various countries' discharge regulations for the types of pollution in question. On this basis the department sees no reason to alter the plans for further restrictions regarding the Norwegian discharge of sulfur dioxide.

Furthermore, the department expects that Professor Rosenqvist and other interested researchers will participate actively in promoting work to register the extent of the pollution problems in Norway, and get the clearest picture possible of the causes. In this connection it is important to note that the precipitation has not only become more acidic, but also has an increased content of other elements, caused by pollution, says the Environmental Protection Department press release.

The leaders of the SNSF project say in their press release that the supply of acidic precipitation is closely related to the discharge of sulfur dioxide from the burning of coal and oil. This discharge has increased with industrial development since the 1800's. However, the increase has been highest during the period 1950-1970, with more than a doubling of Europe's total

discharge. As far as a comparison can be made, there has simultaneously been nearly as high a percentage increase in the supply of acidic components as of sulfuric acids and ammonium sulfate with the precipitation rate. This is highest in Sorlandet, in Rogaland, Vest- and Aust-Agder and parts of Telemark. Interior parts of Ostlandet have a rate half of that in the Sorland area, says the press release of the SNSF leaders.

It has been pointed out that the SNSF project, through its own research and by help of historical data, has shown which areas in Norway are hit by acidic river water, to the extent that surface waters have become steadily more acidic in the course of the past few decades. There are also strong indications of acidification in the border areas of Ostfold, Akershus and Hedmark, an acidic area connected with the corresponding areas in Sweden, it is said.

The fact has also been stressed that the annual catch statistics for Norwegian salmon rivers since 1900 shows that seven rivers at Sorlandet have gradually lost their salmon stock from around 1951 until it today is completely extinct, in contrast to 68 salmon rivers in the rest of the country where the catch has increased during the same time span. Comparisons of the existence of so-called silica algae on six locations in Agder and in Telemark between the years 1946 and 1975 show a clear relative increase in the existence of types that can tolerate acidic waters.

The SNSF leaders also feel that it is of central interest that much of the precipitation of acid occurs over short periods. Strong precipitation in the fall as well as melting waters in the spring carry large amounts of acid to the rivers. The best documented case of a mass fish kill appeared in February/March 1975 in the Tovdal river area, and is connected with the supply of acid components in melted snow on thawed ground.

The SNSF leaders mention in their comments on Rosenqvist's report that Rosenqvist's discussion of the subsoil processes which release and consume acids is an interesting and lucid contribution to the discussion of acidity in our nature. Rosenqvist claims in his report and in press statements that the causes of the acidity must be found in alterations of agricultural procedures, such as reduced pasturing and the closing down of farms.

In its selection the SNSF project has purposely avoided precipitation fields where agricultural alterations have taken place during the past 40-50 years before the research started. These fields will be suitable for experiments with agricultural alterations, and will over an extended period of time, after possible alterations, probably demonstrate their importance.

The technical questions which are discussed here are complicated, and a clarification is difficult through discussions in the press and on the radio. We have therefore tried to present the main lines of the problem in a simple way, the SNSF leaders say, and call attention to the fact that the project researchers have known nothing about the Rosenqvist report's contents until now. Professional comments will be discussed in professional meetings, the press release states.

It is stressed that if Rosenqvist's hypothesis is to carry any weight as evidence, it also ought to be able to explain the corresponding acidity tendencies abroad. The hypothesis also ought to explain why alterations in agricultural procedures have not led to acidity in rivers in other parts of the country with similar soil conditions.

Finally, the leaders of the project consider it their duty to establish satisfactory conditions of cooperation with professional circles within the country, who can make concrete contributions to the work of the project. Thereby the total scientific potential will be utilized in the best possible way, to solve an environmental problem which is of extreme importance to the country, says the statement.

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NORWAY

PROBLEM OF ACIDIC PRECIPITATION EXAMINED

Oslo AFTENPOSTEN in Norwegian 30 Nov 76 p 44

[Article by Georg: "Continued Effort Necessary To Find the Effects of Acidic Precipitation"]

[Text] The precipitation over Norway has not only become more acidic, it also has an increased content of other materials due to discharge of pollutants. The collective effect of this on the short and the long range have not yet been clarified, according to a press report from Norwegian Institute for Air Research (NILU). The press report is a comment on the research report Professor Ivan Th. Rosenqvist recently had presented, where it is claimed, for one thing, that acidic precipitation is not decisive for the acidity of rivers and water courses.

"If it turns out that the information Rosenqvist has come up with is correct, this means that the requirements for purification of sulfur discharges which have been imposed on Norwegian industry must be reevaluated," says engineer Helge Fredriksen of Norway's Industry Federation to AFTENPOSTEN. The Industry Federation has reacted against the requirement that older industry in the eight counties in the southern and the eastern part of the country by 1 July 1978 must use oil with a maximum sulfur content of 1 percent. "Parliamentary report No 44 (1975-76) states that sulfur discharge from Norwegian industry accounts for 30 to 40 percent of the pollution in certain areas, and it is in the general efforts to limit acidic precipitation that the Environmental Protection Department wants to sweep in front of our own door by imposing strict purification measures on Norwegian industry," says Fredriksen. However, he does not want to say anything about the content of the report to Rosenqvist before it has been evaluated more accurately.

The research project on the effect of acidic precipitation on forest and fish (SNSF) does not want to make any statements either on Rosenqvist's report before it has been evaluated accurately. The press release from NILU indicates that this may occur towards the end of December. Since NILU is a participator in the SNSF-project, this institution does not yet want to release detailed comments on the report either.

A Complicated Interaction

However, NILU confirms that Rosenqvist's report gives interesting points of view concerning the conditions in the soil and the acidic precipitation, but the report builds on a series of assumptions which now have to be investigated in more detail. NILU has the task of clarifying the supply of acidic precipitation to Norway. It is agreed that it has increased, and that this is due to long-range transport. One should also be aware that there is a complicated interaction in the atmosphere between the various pollutants which are discharged. The acidification of the precipitation is only one result of this, according to the press report from NILU. Finally, it is emphasized that it is important that the debate which Rosenqvist's report has triggered must not lead to any weakening of the effort to clarify the effect of air pollutants.

"It is important to include critical thoughts regarding the work SNSF conducts as early in the research work as possible," says administrative director in Norway's Technical-Scientific Research Council (NTNF) Robert Major in a comment on the report. NTNF is responsible for important parts of the economic contribution to the SNSF project.

"The problem with acidic precipitation, however, has not yet been solved neither by Rosenqvist nor by SNSF. There are still many open questions left which require further research," says Major. The report contains some irrefutable facts, but also assumptions which we must have time to investigate further.

Rosenqvist presented his points of view at a meeting in Hurdal last spring, where a series of researchers were invited to come with points of view on the results of the preliminary work from SNSF. Rosenqvist then argued with results from a project which had not been made public and which it was therefore difficult to check. When the results from this project now have been documented it will be an important part of the continued work of checking the conclusions in this report.

Nobody Is Kept Out

In connection with the report it has also been indicated that there is a conflict between NTNF together with the corresponding research institutions and our universities. It serves no purpose for us to keep anybody out. Instead there is a desire to increase the collaboration in order to be able to utilize all critical faculties. The SNSF project is now associated with the university environment at Norway's College of Agriculture.

The Environmental Protection Department believes that the new phase which the acid precipitation project now is entering must have as its main goal to check the results which have been found so far, and also to clarify any possible new, important factor in connection with acid precipitation. It will therefore be an important part of phase two of the SNSF project to test the results which have been presented in Professor Rosenqvist's report.

WEST GERMANY

ENVIRONMENTAL PROBLEMS, POLLUTION OF WESER ASSESSED

Weak Points of Environment Policy

Hamburg DER SPIEGEL in German 27 Sep 76 pp 62-66

/Article: "Environmental Protection: A Sisyphean Task"/

/Text/ "In June 1969," thus begins a campaign ad by the Federal Government, "millions of fish in the Rhine died within a few days, since the river contained more trash than could be transported by all the ships using the waterway; in September of the same year, the first social-liberal coalition government assumed its duties."

Since that time, "this government has been pursuing a totally new policy, namely a policy of environmental protection, and all those who used to simply scatter about bleaching earth, oil sludge, acid tar, potash, lead scrapings, fireclay, putty, pitch, glass scrap, waste plaster and rubber, bones, eggshells and poultry skin, used tires, waste gasoline, used cardboard, machine and engine noise, gas stench and toxic sprays, were right away attacked by the government."

Just last week, news of another success issued from Bonn. According to a study prepared by the Frankfurt Battelle Institute at the request of the Federal Ministry of the Interior, air pollution by industrial pollutants, domestic fuel and automobile exhaust fumes will have decreased by 1980 -- sulfur dioxide pollution by 11 percent and hydrocarbon pollution by as much as 30 percent. In the newspapers, this news is reflected in headlines such as: "Pollution Decreasing."

It would be so nice. But skepticism is advisable. In spite of all the efforts put forth so far by the government and the authorities, the pollution of the environment has not been checked by a long way. The country, which is second only to Japan in regard to the severity of environmental problems, has not been able to reduce the risks. At best, it has been possible in some places to prevent the dangers from growing as rapidly as the waste produced by affluence.

And every partial success, for example the elimination of trash in a given area, is offset by some failure in another area, for instance the failure to purify

the air -- according to the president of the Federal Office for the Protection of the Environment, Dr Heinrich Freiherr von Lersner, it is "a Sisyphean task. As soon as we bring one noxious substance under control, another one has become a problem."

"Of course, it is beautiful," boasts the Federal Government in its plainly exaggerated ads, that "it is now possible again to scoop a glass of water out of Lake Constance and to drink it on the spot." The trouble is that the Rhine is still Europe's biggest sewer; the Elbe carries along so many toxic substances that an entire branch of the economy, the fishing industry of the Lower Elbe, is facing its certain demise; and a seemingly healthy river, the Weser, which runs far from the industrial regions, is in fact a garbage chute (cf. p 67).

To be sure, the Government has issued dozens of noise abatement decrees, ranging from the "emission levels for caterpillar graders" to the recently-passed lawn mower decree; at best, however, this serves to check the additional din which otherwise would have come down on the Germans; it does not reduce the increasingly pathogenic noise presently resounding: For the last 2 years, hardness of hearing has been occupying first place on the list of occupational diseases, ranking above pneumoconiosis. Last year, 12,418 applications for noise injury benefits were filed; of these, 2,028 were approved, 1,406 more than in 1970.

In the overcrowded regions, air pollution by dust and exhaust fumes -- dramatically presented in the TV play "smog" -- has of late not increased as much as had been feared, but this is no cause for heaving a sigh of relief, either. Apparently, the pollutants are just differently distributed. The official environmental report for 1976 states:

"Thus, in regard to an important indicator of the extent of total air pollution, sulfur dioxide, there was an improvement of the situation in the densely populated areas; at the same time, however, there was increased pollution by noxious substances in hitherto less polluted regions outside the densely populated areas."

According to official estimates, this goes also for other noxious substances, especially for fine dust; after all, fine dust does not come down in thick flakes, nor does it fall just on the Ruhr region and the Rhine-Main area; rather, it sinks down, finely distributed, across the whole country -- overall more, not less poison.

Meanwhile, the Government claims to have done "what could be done through mere injunctions and decrees": Through the gasoline-lead law, the air traffic noise law, the water conservation law, the law on the preservation of natural beauty and wildlife, the forestry law, the mining law, the law on environmental statistics and the law on protection from harmful environmental effects.

The packet of legislation, which also includes hundreds of decrees, is almost complete. But not all that was passed by parliament was the legislative

optimum -- in the case of the sewage tax law, it was even the opposite of what would be politically necessary. The objective had been to restore the purity of the rivers and lakes. Polluters were to be fined for any trash dumped or channeled into the waters. The government bill -- supported by a report by the Council of Experts for Environmental Problems -- provided that from 1976 on, polluters were to pay an annual fine of DM 25, and from 1980, DM 40 for a certain damage unit (it is roughly equivalent to the sewage pollution by one person in 1 year) -- fees earmarked for sewage treatment and at the same time, an incentive to build water purification plants, which ultimately would be more economical.

The Federal Ministry of the Interior now claims that when the bill came up for discussion, the parties concerned immediately "cried murder and raised barricades," all those people who had so far been dumping their trash into the water with impunity: "The municipalities and industry acted in concert."

The municipal and district councils, which according to the experience of the SPD fraction's environmental expert, Klaus Konrad, "would rather build 10 stadiums than one water purification plant," deplored the financial distress of the municipalities; "captains of industry threatened to lay off personnel and to transfer abroad their production sites" (Ministry of the Interior); within the parties, economic and environmental experts quarreled about priorities.

The lobby's success: The sewage fees were reduced to such an extent, and the dates of payment were postponed so far that even Federal President Walter Scheel -- who ordinarily is rather partial to industry -- complained about it. "A law meant to protect the environment," says Benno Weimann of the biggest German water works, Gelsenwasser, Inc., "turned into a law protecting the polluters of the environment." Apparently, this is realized also by Federal Minister of the Interior Werner Maihofer who suggested revising the law in the next legislative session.

Most of the other laws, however, are considered faultless even by suspicious critics in citizens' environmental initiatives. "In itself, the wording of the law is all right," says the Hamburg environmental protection activist Dr Reinmar Grimm, "but what is being done with it, is scandalous." For when the regulations are to be applied, it turns out that their intended effect is mitigated in sometimes disastrous ways.

-- State and municipal administrations are quarreling about the jurisdiction over environmental protection; these quarrels impede the enforcement of environmental protection requirements.

-- The seeming conflict between economic growth/job security and protection of the environment unites municipalities, employers and employees in a lobby against effective environmental protection.

The federal law on noise abatement and protection from harmful environmental effects exemplifies the rift between law and reality; this law is to protect

"people, animals, plants, and other objects from harmful environmental effects" and "from dangers and serious detriments and molestations" by noise and air, and it is to prevent "the development of harmful environmental effects."

However, since there is a lack of reliable knowledge on the interrelated effects of the thousands of noxious substances, there is also a lack of administrative regulations which clearly establish what levels of noise and smog are permissible. Likewise, the authorities are supposed to be entitled to impose requirements in accordance with the "level of technology" of the day -- a flexible concept, of which only one thing can be said with certainty: The level of technology is not always that which is technologically feasible*.

For example: Washing installations for the removal of sulfur dioxide have been successfully tested for years, but not nearly everywhere are they obligatory; lawn mowers may produce more noise than is acceptable to the neighbors or technologically sensible. And: The French-British supersonic jet "Concorde" is twice as noisy as the British "Super-One-Eleven" which produces twice as much noise as the American "Boeing 727", and that airplane is twice as noisy as the Eurojet "Airbus."

The Ministry of the Interior knows as well how one could raise the level of technology, for instance for automobiles: "If our cars were taxed not by cylinder capacity, but in accordance with the volume of exhaust fumes and noise they produce and according to the degree, to which they wear down our roads," "we would very soon have an environmentally safe automobile."

However, regarding a sensible reform of the automobile tax, which has been talked about for years, government and parliament have been no more successful than in regard to other urgent rulings. The Bundesrat /Upper House of Federal Parliament/ refused to grant to Bonn total jurisdiction over the domains of water, protection of natural resources and wildlife, and preservation of scenic beauty, and it blocked individual laws on environmental protection; as a result, there is today no uniform law on access to forests; a fundamental right to an environment worthy of a human being -- requested by the Council of Experts and promised by ministers -- did not materialize; the criminal law on environmental offenses, which does not sufficiently take into consideration the socially harmful effect of environmental offenses, is not integrated into the criminal code.

A bill which was to make obligatory a "test of environmental safety" for any state action did not get past the cabinet. According to the Council of Experts, the law appeared to be "necessary, since not nearly all environmentally relevant laws contain adequate environmental protection clauses and since many environmentally harmful activities, including activities of the public authorities, are performed outside of legal authority;" in addition, the Council deplored the "jurisdictional gaps and overlappings" on "all government and administrative levels."

* "Level of technology" is defined by the law as the "stage of development of advanced procedures, installations or methods of operation," especially of installations "the performance of which has been successfully tested."

The jurisdictional muddle begins already within the Federal Government: Owing to the divergence of interests and influence of the respective lobbies, almost every department takes a different view of the environment. The muddling of accountability "has created intrinsic departmental dynamics," stated the Council of Experts, "which cannot be neutralized even by procedurally established rules of coordination."

Rather, "success-oriented departmental strategies" lead to a "negative coordination": "In coordinating their policies with the other departments, each department protects its own interests." If the Cabinet arrives at an agreement, it can happen "that some cuts are made by the parliament" (von Lersner), before the Bundesrat [Upper House of Federal Parliament], which is dominated by CDU and CSU, trims to size the pollution-protection measures. The subsequent implementation is encumbent on the individual provinces and authorities, which display their own floral splendor in the jurisdictional jungle.

Within the provincial governments, the distribution of affairs is no clearer than on the federal level, where -- as a minister for environmental protection put it -- "everyone fights everyone else." The Bremen Senator Herbert Brueckner, for instance, who is in charge of environmental and health matters and who presently chairs the Conference of Ministers for Environmental Protection, bears "the responsibility for the whole city, but I do not have jurisdiction."

Finally, regarding the responsibilities on the administrative level, even the Council of Experts can "hardly keep track." Countless administrative bodies and special departments in charge of individual environmental sectors "just putter along," as an environmental protection official from Lower Saxony complains, "and do not give a damn about pollution." According to the criticism expressed by the experts, the "inadequate enforcement" of the environmental protection law "by the state and municipal administrations should have been recognized and condemned as a socially harmful mistake from the very beginning."

In regard to environmental protection, there apparently is on all political levels a clash of too many interests -- a tug of war which quite frequently cannot be decided in favor of the environmental policy officially announced by the Federal Government. This quarreling is "somewhat like haggling," complains the Ministry of the Interior, "and in the exchange of specious arguments, environmental protection is almost always the loser."

Salts, Waste Water, Heat Endanger Weser

Hamburg DER SPIEGEL in German 27 Sep 76 pp 67-81

[Article: "That the River Is So Sick..."]

[Text] In the last few weeks, experts on water resources such as the engineering diplomats Klaus-Martin Liersch "sometimes felt like doctors fighting for the

life of a comatose patient." In the words of the head government surveyor of works of the water resources department at the Hannover minister president's office: "One moment, a life-saving injection; the next moment, a life-saving transfusion."

The dangerously ill patient is the Weser River; with acute dyspnea, it lies in the riverbed. Due to lack of oxygen, the river, Germany's fifth largest, is in danger of tipping over in its middle and lower course -- of turning into a putrid sewer.

During the last few months, the collapse could be prevented only by oxygen injections and artificial aeration. In Bremen, for example, the authorities rented a construction compressor from a private firm; for weeks, this machine has been roaring on the banks of the Weser, pressing air into perforated hoses placed on the river bottom. Bubbling upward, the compressor air is to enrich the surrounding water with oxygen.

Like an aquarium fancier treating his goldfish container, the Bremen water resources agency aerates the Weser also a short distance downstream. There the compressed air supplied by a shipyard feeds a hose setup "of the home-made type," as the head official, Hans-Dieter Buecken, calls it; and at the tidal floodgates of the Lesum River, a tributary of the Lower Weser, the sick river was administered oxygen injections by means of the de-icing installation.

Above Bremen, on the other hand, in the parts of Lower Saxony and North Rhine-Westphalia, where the middle Weser is canalized, the Preussenelektra energy concern -- at the request of the Hannover water resources office -- closed the feed pipes of its hydraulic power stations at five Weser reservoirs. The water is now conducted over the weirs instead of through the turbines so that in falling from the dam walls it can take in oxygen.

At kilometer 248, Weser water was for aeration purposes temporarily pumped through the cooling tower of the Preussenelektra "Robert Frank" steam power plant. As in other stretches of the dammed-up middle Weser, the river's oxygen content had temporarily dropped here to the zero mark -- a healthy body of water is supposed to contain approximately 6.5 milligrams of oxygen per liter; 2 milligrams of oxygen is the minimum amount necessary for the survival of fish and microfauna.

It makes no difference, if expedients, such as the compressors and hoses and other brainchildren of the water administrators, will once more revive the Weser -- "strictly speaking," says Liersch, it is just a "doctoring" of symptoms.

It does not really make a difference: Too little water flows down the river, and too much dirt goes into it.

"It is hard to believe that the river is so sick," says Liersch -- and true enough, at first glance it does not look that way. On the contrary: Aside from the Bremen area, the Weser does not pass through any densely populated areas. So far, there are no blast furnaces or batteries of hydration towers obstructing the view of the bronze Emperor Wilhelm, who on Mount Wittekind guards the Porta Westfalica, or of small-town half-timbered houses and a great expanse of German forest.

Not overland railroads or highways, but the "German Fairy Tale Road" is the main traffic artery passing through the Weser valley. It calls to mind the Pied Piper of Hamelin, Muenchhausen the Liar in Bodenwerder and Sleeping Beauty's castle in the Reinhard Forest. But it is only outwardly that the countryside is intact:

In terms of the quantity of flow, the Weser is more heavily polluted with salts than any other big German river. If the salts in the riverbed were transported by the federal railroads, freight trains made up of 40 cars with a capacity of 15 tons each would have to roll toward the North Sea at 55-minute intervals.

On the banks of the Weser, there are eight conventional power plants and one nuclear power plant, the combined output of which constitutes 5 percent of the Federal German electric energy production; all of them draw their cooling water from the river. Two additional high-capacity nuclear power plants with an output comparable to that of the Biblis plant (1,300 megawatts each) are under construction.

The Weser is extremely dependent on climatic conditions; unlike other German rivers, it is affected by a precipitation deficit.

The dry summer and winter of last year and the hot summer of 1976 had such an effect on the Weser that since July all shipping on the upper course of the river has been at a standstill: The barges no longer have enough water under the keel -- in normal dry years, this happens at the most in October.

Likewise without precedent is the fact that power plants such as the Veltheim cooperative power plant near Rinteln and the Preussenelektra "Heyden" Plant below Minden (capacity 320 megawatts), which use Weser water for cooling their steam condensers, were for a time forced "to reduce their output considerably."

The river flow was so low and owing to solar radiation, the water temperature was so high that under conditions of full-load output, the power plants' cooling water would have raised the water temperature past permissible levels. In the opinion of the government surveyor of works of the State Office for Water and Waste Management, Horst Bernhardt, "the situation also had its good points": The energy producers on the banks of the Weser had now "realized that there are limits."

In August, for example, a mere 25 cubic meters of water per second flowed down the Upper Weser at the Karlshafen water-level gauge. The annual average recorded at this gauge in the period from 1941 to 1975 is 135 cubic meters, i.e. over five times more than presently recorded. Near Nienburg (normal river flow data for August/September: 123 to 137 cubic meters), the Weser in the last few weeks oozed along at the rate of 20 cubic meters per second -- closer and closer to "death from lack of oxygen, which we know only in theory" (Liersch).

The Weser presently resembles a flush toilet in which the water is reduced to a trickle. With a drastically decreased flow, it must transport the same amount of pollutants as was carried at normal water levels.

Every decrease in the Weser's water level entails an increase in the concentration of oxygen consuming substances from the sewers of the communities, or of toxic substances from industrial waste waters and salts.

The sparser the flow of the river, the greater is the danger that its biological autopurification will no longer function and that lack of oxygen, toxic waste water and salts will destroy fauna as well as flora.

The prognostics of such a situation are increasing. The dilemma of the Weser is made evident by the suddenly decreasing fish harvests, the jet-black coloration of the water -- the surest evidence of a high oxygen deficit --, and the flights of crows which are hovering over the river, thus indicating another widespread dying-off of fish.

As to the reason, for example, why this summer only half as many eels were caught in fish pots and hand nets, the Nienburg master fisherman Wilhelm Dobberschuetz gives the following explanation: Threatened by the oxygen shortage, the eels had partly "taken to flight" and partly "become inactive" -- "they hardly move or eat so as to survive with reduced oxygen consumption."

On 11 and 12 August, the instinct of self-preservation could not save thousands of chubs, roaches and breams in the Weser below Minden. Some 500 hundredweights of dead fish were collected by the fire brigade and the Technical Auxiliary Organization on the river banks and breakwaters.

According to the Goettingen fishery biologist, Professor Guenter Buhse, it was the "excessive salt concentration" in the Weser water, which caused the "slow dying-off of fish" discovered in the Upper Weser in the last week of August. Within a few hours, the rake at the cooling-water intake of the Wuer-gassen nuclear power plant landed 4 and 1/2 tons of dead roaches, dace and breams -- dead from an overdose of potassium.

According to Richard Mundt of the Lower Saxony Association of Sports Fishermen, until the 1960's the Weser was still regarded as an "Eldorado for anglers from all over the Federal Republic, as one of the German waters abounding in

fish." Today even the Weser eel must be "soaked for 3 weeks," before the landlady of the "Golden Anchor" in Bodenwerder can serve it up. Meanwhile, the Sports Fishing Club Bodenwerder to Heinsen e.V. /registered association/ moved the site of its annual fishing contest from the Weser to a gravel pit.

On the Federal German water quality chart, the predominant color for the Weser is light green; this is the color identifying class II to III, the fourth of seven water quality classifications: "Critical degree of pollution -- water sectors, the pollution of which with organic, oxygen consuming substances causes a critical condition."

But over many dozens of kilometers, the Weser already shows a light yellow, the color identifying class III; it is the standard color for the Rhine between Ludwigshafen and the Dutch border: "Heavily polluted -- water sectors with heavy organic, oxygen consuming pollution ... in some places sapropel sediments ... a periodic dying-off of fish is to be expected."

In the River Sediment, Substances Considered as Carcinogenic

In 1972, Heidelberg mineralogists examined for the first time the sediments of German rivers for deposits of environmentally harmful heavy metals such as lead, zinc, mercury and cadmium. Almost everywhere they found dangerous concentrations of the poisonous substances; it was discovered that the Weser and the Elbe contain the highest percentage of the noxious substances, which affect the bones, blood vessels, muscles and nerves.

With regard to zinc, for example, which is deposited in the river sediment primarily by sewage from the communities and which is among the substances suspected of being carcinogenic, the Weser occupies first place. Scientists have been able to show that from the riverbed, the zinc can quite easily get into the so-called riparian filtrate, from which adjoining communities such as Vlotho or Bad Oeynhausen obtain part of their drinking water.

So far, nobody had been able to identify precisely all the sewage and poisonous broths slopping into the Weser water or to determine their sources. As yet, there is no pollution chart, no inventory of all the influxes. The "Weser Work Team" of the four Bundeslaender /Federal Provinces/, which -- together with a federal shipping office -- have jurisdiction over the river, will now draw up such a chart.

The only accurate data is the following: Once every 24 hours, 15,500 tons of salts flow down the river, i.e. at least 12,000 tons more than acceptable. These salts are chlorides, a by-product of potash production. They derive almost exclusively from the catchment area of the Werra -- and in that area, 90 percent of the salts originate in GDR plants.

Salt From the GDR in Bremen's Drinking Water

As late as the beginning of the 1950's, a German-German agreement drawn up by a "Potash Waste Water Commission" had been regarded as binding; according to this agreement, 1 liter of Werra water was to contain no more than 2,500 milligrams of chlorides. West German producers in the Hessian part of the potash production area were granted 38.11 percent of the pollution quota, whereas the GDR producers in Thuringia were allotted 61.89 percent.

From 1953 on, the GDR no longer released information concerning the influxes within its borders, and by 1968, the Central German potash producers also disregarded the maximum limits; their waste water technology probably was no longer equal to their increased production.

The chloride pollution showed a fourfold increase, at low water even a thirteenfold increase over the concentration level agreed upon. Near Bremen, the Weser meanwhile reached salt concentration levels, which at one time had been set as maximum levels for the Werra. Bremen's drinking water, in which Weser water constitutes 40 percent, has at times a salt content of approximately 800 milligrams per liter, i.e. four times as much as the EC drinking water standard.

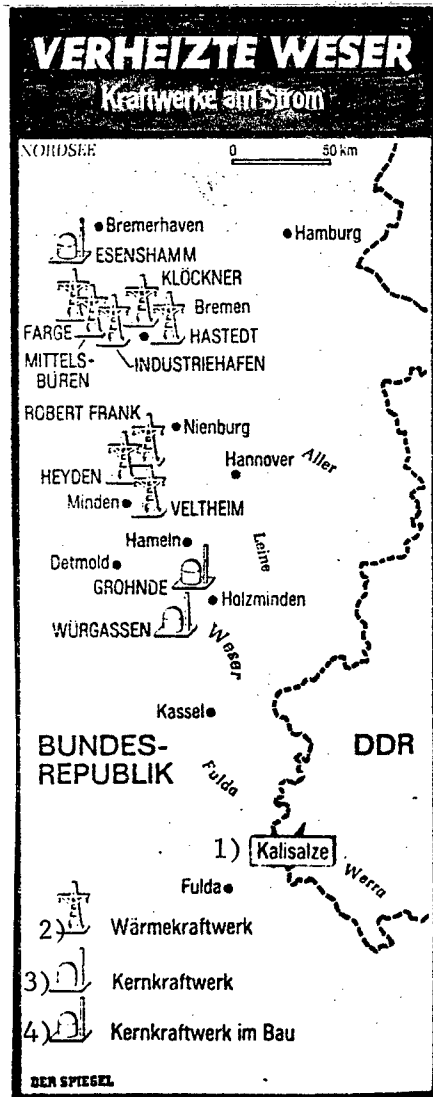
In the meantime, the chlorides turned the Werra "into a biologically dead river;" and according to fishery biologist Buhse, the "atrophy through oversalting" has already begun in the Weser as well: Aquatic plants such as rushes and certain algae are withering away, microorganisms -- a food source for fish -- are decreasing, fish are contracting diseases and are dying off in increasing numbers due to the toxic effects of substances such as the potassium contained in the salts; finally, bacterial activity is decreasing and therewith the Weser's auto-purification capacity.

Occasional contacts across the border -- aimed at containing the salt flood from the East -- always proved unsuccessful, and since the establishment in Berlin of the Federal Office for the Protection of the Environment, the GDR is no longer prepared to engage in talks about environmental protection problems.

However, leaving aside this all-German Weser problem, which for the time being is insoluble -- Weser expert Mundt "sometimes asks himself, whether we still live at a time, in which waste water technology has just been invented." One could assume so:

"The water purification installations are too small or not fully developed," says Dr Joachim von Loh, a chemist in the Lower Saxony Water Inspection Office. According to the Minden government surveyor of works, Horst Bernhardt, the construction of biological purification installations, which in view of the present technological know-how could decompose 90 to 95 percent of the pollutants, "has not kept up with the development of requirements. In many places,

there are only mechanical installations, which merely remove dirt and sediments or -- as is also the case sometimes -- none at all. These are the results of a lack of long-range planning, of the municipalities' financial incompetence or of "a simplistic way of thinking" which -- according to a Bremen official, Buecken -- "until the 1950's was commonly accepted: At that time, it was only natural to pipe the untreated sewage into the big rivers -- motto: 'They will be able to take it.'"



Map. A Burned-Out Weser -- Power Plants on the River
Key:

1. Potassium salts
2. Thermal power plant
3. Nuclear power plant
4. Nuclear power plant under construction

Although the cities and enterprises on the Weser are for the most part only of medium size, the dirt accumulates: Directly below Hannoversch Muenden, dirty-brown lumps of foam drifting on the Weser for many kilometers are evidence of a cellulose plant's insufficient waste water treatment.

Downstream in Holzminden, the municipality's biological purification installation is only one-third finished. Minden still relies totally on the Weser's purification capacity and the city's entire sewage -- amounting to 320,000 EGW /resident equivalent/*, including 100,000 EGW from a plant of the Knoll chemical concern -- is merely mechanically prefiltered, before it is piped into the river.

Only 35 percent of the sewage of Bremen, a city of 721,000 people, run through the trickling filters, activated sludge installations and secondary purification tanks necessary for a fully biological purification. Long-established industries with equally old water rights, such as the Bremen wool carding mill, which produces an especially "difficult sewage" (Buecken), pipe totally untreated waste matter into the Weser.

This does not by any means dispose of the sewage, despite the proximity of the river's estuary. Due to the tides, the slops pass through the city more than once, and sometimes the broth is warm to boot -- and thus more dangerous.

The power plants constructed along the Weser take such quantities of cooling water from the river that on flowing back -- heated to 33° after use -- it effects a lasting increase in the river temperature. On some days during the past hot summer, for example, the water temperature below the "Robert Frank" power plant briefly reached 29°, and "as soon as the river reaches 25° and more," the professional fisherman Dobberschuetz finds a "greater incidence of disease" in the fish -- increasing symptoms of eel erysipelas, for example.

For excessive heat input interferes especially with the oxygen balance: On the one hand, warm water absorbs more oxygen than cold water; on the other hand, warmth accelerates the vital processes -- for example, the decomposition of biological pollutants -- and thus intensifies oxygen consumption.

Moreover, in a warm river the poisonous substances in the sewage have a more intensive effect, and finally, a warm river evaporates its water more rapidly -- a vicious circle: The evaporation losses lower the water level, thus concentrating the dirty, salty broth still further.

Due to the presence of large quantities of salts and sewage, which anyhow have an unfavorable effect on the heat balance, it has so far not been possible to pinpoint any damage caused by waste heat. But "of course," says the Bremen Surveyor of Works Buecken, "the power plants with their heat have contributed to the bad condition of the Weser."

* One resident equivalent equals the amount of waste matter produced by one person per day. The quantity and waste matter content of industrial sewage are likewise calculated on the basis of EGW.

Altogether, there are eight conventional power plants -- run with natural gas or coal -- on the banks of the Weser. They have a total capacity of approximately 3,000 megawatts and they require approximately 150 cubic meters of cooling-water per second; if this quantity of cooling-water were to be taken from only one place in the Middle Weser, the water would no longer suffice; the river would have to pass five times through the power plants. In addition to the conventional plants, a nuclear power plant on the Upper Weser near Wuergassen is already in operation (640 megawatts, cooling-water requirements up to 28 cubic meters).

In order to limit "the Weser warm-up caused by the inflow of cooling-water" and in order to reduce "any additional strain on the river, which is anyway heavily stressed by the influx of waste water," a "Weser thermal stress plan" was drawn up in 1974 by scientists and authorities of the adjoining provinces of Hesse, North Rhine-Westphalia, Lower Saxony and Bremen.

According to this plan, the warm-up range in the Weser's freshwater zone and the temperature in the mixed-water zone below the cooling-water inlet of a power plant must not exceed 3° and 28° respectively. For the brackish water of the Lower Weser, the maximum limits are 2° and 26°. Further, the stress plan stipulates that cooling towers or similar cooling systems are "necessary for the maintenance of warm-up ranges and temperature limits;" for: "Through such systems, the thermal stress must be adjusted to the requirements of the water."

At present, Wuergassen utilizes only 80 percent of its capacity, and due to numerous technical failures, it had to be shut down repeatedly. The Minden water expert Bernhardt feels that if Wuergassen operated at full capacity and without interruption, "temporary reductions of output would surely have been necessary" this year -- the maximum limits stipulated by the stress plan would probably have been exceeded. For the same reason, even the conventional power suppliers Veltheim and Heyden were forced last summer temporarily to cut back their production.

Thus it appears to be downright absurd that two additional nuclear power plants are to warm up the Weser still further:

- In Grohnde near Hameln on the Upper Weser, a 1,300-megawatt-nuclear power plant is under construction, one of the largest plants in Europe.
- Near Esenshamm on the Lower Weser, another 1,300-megawatt-plant is to go into operation in the spring.

If the Esenshamm builders (Preussenelektra and NWK /Northwest German Power Plants/ have their way, there will be no cooling towers or any similar cooling system -- alarming prospects which prompted the Hanse City of Bremen to institute administrative proceedings against Lower Saxony; the construction site is in Lower Saxony.

Are Nuclear Power Plants Good for the Rivers?

Bremen wants the Second Operating Permit -- which was granted by Lower Saxony and is based on the law relating to water-- to be revised so as to lay down precisely the course of action to be followed by the operators in the event of the water temperature at Esensham reaching a critical range -- no matter what the underlying causes: Interference by the power producers, hot weather, or pollution.

Meanwhile, in the week before last, the Oldenburg Administrative Court ruled that the water law permit itself is invalid. In connection with a suit filed by Gustav Schaefer, a Lower Weser fisherman who feels the power plant jeopardizes his livelihood, the court noted -- without going into the substance of the suit -- that the official permit represents a violation of "established law."

In the preceding First Partial Permit [pertaining to atomic power law], the competent district administration had expressly stated that the problem of cooling-water inflow near Esensham would have to be solved in accordance with the stipulations of the thermal stress plan, which at that time had not yet been completed. However, when the time had come, the district administration dispensed the operators from the requirements imposed by the thermal stress plan, such as the construction of cooling towers or equivalent cooling systems, thus saving Preussenelektra and NWK approximately DM 80 million.

Nevertheless, the energy producers consider themselves benefactors of the Weser. In ads. placed in July in provincial newspapers of the Weser region, the concern claimed that "again and again, Preussenelektra saves the Weser from tipping over;" the river is pumped "full of oxygen" and such measures are paid for "out of our own pocket." Says Preussenelektra: "Power plants make rivers healthy, not sick."

The fatal logic of this ad lies in the generalization. What may be sufficient in an individual case or on the local level for saving a sick river from biological death, is unsuitable as a principle. Otherwise, one would have to say: The greater the number of nuclear power plants in the Federal Republic, the cleaner the German waters.

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BAVARIA'S ENVIRONMENTAL PROTECTION TERMED EXEMPLARY IN FRG

Bonn DIE WELT in German 5 Jan 77 p 3 DW

[Article by Peter Schmalz]

[Text] Munich--The Bavarian State Ministry for Regional Development and Environmental Affairs is 6 years old. It continues to be the only ministry of its type in the Federal Republic. In an interview with DIE WELT Minister for Environmental Affairs Max Streibl stated that the "Bavarian Model" offers the unique chance to get a grip on protective environmental planning on a long-term basis. Any measure of regional development and regional planning at the same time is an act of environmental shaping. Still, his ministry only requires about DM1.5 million or 6 percent of the Bavarian state budget, he said.

According to Streibl, Bavaria has reached an internationally leading place in coping with the problems of poisonous waste disposal. In line with this it has implemented with considerable financial expenditure a modern concept of special-waste disposal.

Bavaria attaches special importance to the "recycling" technology. The most topical project is a "pyrolysis" installation whose construction probably will be started before the end of 1977. Reusable materials such as oil and gas can be obtained from household garbage in this installation. At the same time Bavaria tries to reclaim heavy metals from production waste through other methods.

As for keeping the air clean, the minister said that Bavaria has gained a reputation through its modern, fully automatic air-control system. Since its establishment the ministry has allotted more than DM100 million in subsidies and reduced-rate credits for the maintenance of clean air by the communities and by industry. As a result of measures to this end Munich, for example, shows the least sulfur-dioxide burden among 27 German big cities. Streibl announced that Moscow will purchase three projects of the Bavarian air-control system in the near future.

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